

## Two Undescribed Types of Rock Outcrop Vegetation in Georgia

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For over fifty years marble has been quarried in a narrow belt extending with a few ramifications and interruptions from a point about fifty miles north of Atlanta northward into North Carolina, in a region difficult to classify geographically, which may be regarded as partly in the Blue Ridge and partly in the Piedmont region. This belt is many miles from any other calcareous rock, and is bordered on both sides by gneisses, schists, etc., characteristic of the Appalachian region.<sup>1</sup> It was therefore naturally to be expected that on and around the marble outcrops there would be some plants not found elsewhere in that part of the state; but in spite of the accessibility of the marble area since the building of a railroad near it about forty years ago, apparently no botanist had taken the trouble to investigate it until the time here mentioned.

In October, 1928, on returning from a trip to the mountains farther north, I stopped for part of a day at Tate, in Pickens County, the nearest railroad station to the principal quarries. I could spare only one afternoon for the investigation, it was 2 P.M. when I got off the train, and I had to walk about two miles east, to Marble Hill, to find a suitable outcrop, and wade a creek to get to it. My notes therefore are not very full, but they will serve to attract attention to this vegetation, and perhaps lead to some interesting discoveries later.

The marble is partly in the bottom of a narrow valley (that of Long Swamp Creek, and its eastern fork), and partly on the adjacent slopes. That in the bottom of the valley is covered with rich red residual soil, which may have had some interesting plants on it originally, but is now mostly cleared and cultivated, as well as excavated in several places to get at the marble beneath. The adjacent bluffs have been quarried extensively too, but I managed to find a few places where

<sup>1</sup> For a recent geological description of the most important marble area see W. S. Bayley, *Geology of the Tate Quadrangle, Georgia*. Geol. Surv. Ga., Bull. 43. ix + 170 pp., 22 plates, 2 folded maps. 1928. It is also described in less detail by S. W. McCallie (the present state geologist) in the first bulletin of the same office, published in 1894 and revised in 1907.

approximately natural conditions still existed. The bottom of the valley is about 1000 feet above sea-level, and the bluff at Marble Hill rises about 500 feet higher, but the marble seems to be all within about 100 feet (vertically) of the valley bottom.

The following plant list is made up of plants seen on October 17th on the lower part of the bluff, which faces northward and is pretty well covered with rich residual soil and humus, except where the marble ledges protrude. The line of contact between the marble and the non-calcareous rock above it was rather obscure, but I determined it approximately by means of the vegetation. The vegetation had been damaged a little by human agencies, but weeds are excluded from the following list. In the short time available it was not possible to examine a large enough area to determine the relative abundance of the species very well, and the following sequence is only tentative. Trees, shrubs, vines, etc., are separated, as has been my custom for many years.

## TREES

*Tilia sp.*  
*Liriodendron Tulipifera*  
*Fraxinus americana*  
*Quercus borealis maxima?*  
*Ulmus fulva*  
*Quercus Michauxii?*  
*Juglans nigra*

## SMALL TREES

*Morus rubra*  
*Cercis canadensis*  
*Halesia carolina*

## VINES

*Rhus radicans*

## SHRUBS

*Benzoin aestivale*  
*Asimina triloba*  
*Philadelphus sp.*  
*Staphylea trifolia*  
*Hydrangea arborescens*  
*Adelia ligustrina?*  
*Corylus sp.*

## HERBS

*Heuchera macrorrhiza*  
*Solidago flexicaulis*  
*Adiantum pedatum*  
*Aster cordifolius*  
*Eupatorium ageratoides*  
*Adicea pumila*  
*Collinsonia anisata*  
*Aquilegia canadensis*  
*Polystichum acrostichoides*

None of the species above listed are confined to calcareous rocks or soils, but several of them are more abundant in such soils than in acid soils. Some are very characteristic of the shale bluffs along the Warrior River in Tuscaloosa County, Alabama, described by the writer a few years ago.<sup>2</sup>

<sup>2</sup> Jour. Elisha Mitchell Sci. Soc. 37: 153-160, pl. 28. April, 1922.

If this place could be visited in spring doubtless several additional species could be found; and if there are any southward-facing bluffs of marble they should have a rather different vegetation. It would be very desirable to make additional explorations in the neighborhood before the quarrymen have extended their operations much further, for every marble outcrop is liable to exploitation sooner or later, and their aggregate area is very small.

Two other plants seen near Tate deserve mention here, though they have little or nothing to do with the marble outcrops. In dry pine woods (*Pinus echinata* and *P. Taeda*) about half way between the railroad station and the valley of Long Swamp Creek, one of the commonest plants at the time of my visit was a form of *Coreopsis Oemleri*. That species usually has opposite leaves three-parted to the base, giving an appearance of whorls of six lanceolate leaves. But at this particular locality many of the plants had the uppermost leaves, and sometimes most of the leaves, reduced to a single lobe. (A different variety of the same species will be mentioned farther on.) Associated with it was *Aster surculosus*, a species I have not met many times. Specimens of both were collected, and have been distributed to a few herbaria.

The other kind of rock outcrop to be described is at the inner edge of the coastal plain, not far from the eastern border of the state. In traveling on the Georgia Railroad in the early years of the present century I had several times noticed in cuts and elsewhere in the vicinity of Harlem, in Columbia County, some rock of a peculiar purplish hue. As this is very close to the fall line, and as rock of very similar color and undoubted Triassic age occurs along the fall line (as well as farther inland) in North Carolina, I at first imagined this to be an unrecorded outlier of Triassic (which is otherwise unknown in Georgia). But inquiry among geologists and examination of geological literature threw no light on the subject.

There the matter rested for over twenty years, until on visits to Harlem in June, 1927, August, 1928, and June, 1929, I had opportunity to look into it more closely. The purple rock is evidently one of the coastal plain deposits, for one must go north from Harlem a mile or so before encountering fragments of crystalline rock mixed with the unconsolidated sands

and clays, and perhaps twice that distance to find soils unquestionably residual from ancient rocks. A hill about a mile and a half north of Harlem is capped with the purple rock but has angular pieces of quartzite, some about a foot long, on its southern slopes and even farther south. The rock in question occurs on comparatively level uplands, and does not seem to form continuous ledges of any considerable extent, but is a sort of surface crust, commonly only a foot or two in thickness and broken up into fragments ranging from about the size of a pea to that of a man's head, and in some places covering the ground so thickly as to prevent plowing. It is often mottled with white, in much the same way as many of the non-calcareous clays of the coastal plain, and it is probably only an indurated clay. The larger pieces have been used locally for curbing and foundations, and there is one handsome modern house in Harlem with outer walls built entirely of this rock (perhaps the only one of its kind in the world), and another with porch columns constructed of it. Smaller fragments are used for road material.

In some respects it strongly resembles the Altamaha Grit, which characterizes one of the regions farther down in the coastal plain,<sup>3</sup> but that forms thick ledges, usually on hillsides or near streams, and is more brownish in color, much like pine bark. All the purple rock that I have seen is within a mile or two of Harlem, in the counties of Columbia and McDuffie; but of course there may be other occurrences of it at a greater distance. Its area seems to correspond approximately with that of the "Greenville gravelly loam"<sup>4</sup> described by C. N. Mooney and A. E. Taylor in their soil survey of Columbia County, published by the U. S. Bureau of Soils in 1912. The areas of that soil there mapped are all within two or three miles of Harlem, and their aggregate extent in the county is put at 1600 acres.

The vegetation on the purple rock is much less unique than that on the Altamaha Grit, and shows nothing remarkable except in the abundance of certain species that are scarcer elsewhere and the variation of some others from their typical forms,

<sup>3</sup> See *Torrey* 4: 140; 6: 242; 11: 97.

<sup>4</sup> This designation is rather misleading, for the purple rock seems to have no gravel in it, and it has little in common with any rock or soil near Greenville, Ala. (from which that soil series name seems to have been derived).

but it is worth putting on record. From rather fragmentary observations on three different days in consecutive years I have made up the following plant list, which arranges the species in each size class in approximate order of abundance, as before, and omits those noted only once.

## TREES

*Pinus Taeda*  
*Pinus echinata*  
*Pinus palustris*  
*Hicoria alba*  
*Quercus falcata*  
*Liquidambar Styraciflua*

## SMALL TREES

*Quercus marylandica*  
*Cornus florida*  
*Quercus stellata*

## VINES

*Vitis rotundifolia*

## SHRUBS

*Climopodium georgianum*  
*Polycodium caesium?*  
*Rhus copallina*  
*Crataegus uniflora?*  
*Rhus Toxicodendron*  
*Ceanothus americanus*  
*Vaccinium pennsylvanicum?*

## HERBS

*Cracca virginiana*  
*Coreopsis Oemleri*  
*Andropogon scoparius*  
*Eupatorium album*  
*Sericocarpus asteroides*  
*Silphium compositum*  
*Pteridium aquilinum*  
*Laciniaria graminifolia*  
*Solidago odora*  
*Erigeron ramosus*  
*Polygala Curtissii*  
*Vernonia oligophylla*  
*Nolina georgiana*  
*Lespedeza repens*  
*Allium mutabile?*  
*Chrysopsis graminifolia*

Most of the specimens of *Pinus palustris* were rather stunted, as if the environment did not suit them very well; but there may have once been larger ones, that have fallen a prey to lumbermen. The *Climopodium*<sup>5</sup> is more abundant there than I have seen it in any other equal area. (It seems to have been discovered by Michaux near Augusta, about 25 miles away.) Most species of *Polycodium* have fruit that is rather bitter and not very palatable, but the one on the purple rock had the largest and finest fruit (ripe in late August) that I ever saw in that genus, with the possible exception of a taller one that grows in sandy hammocks in Wakulla County, Florida. The species in this genus are not very sharply defined, and this

<sup>5</sup> Formerly called *C. carolinianum*. For the reasons why that name was untenable see Bull. Torrey Bot. Club 33: 243-245. 1906.

one may not be typical *P. caesium*, which is common on sand-hills in the coastal plain of Georgia and the Carolinas.

The *Crataegus* is a shrubby one, with the aspect of *C. uniflora*, but its fruit (in August) is redder than I have been accustomed to in that usually easily identified species. Most of the specimens of *Coreopsis Oemleri* have very narrow, almost linear, leaf-segments (var. *rigida*?) and occasionally (in McDuffie County) the middle segment is divided near the the middle into three, making an opposite extreme from the form in Pickens County above mentioned, and indicating an approach to *C. delphinifolia* or *C. verticillata* (neither of which is known in that neighborhood, however).

*Erigeron ramosus*, which is an abundant weed in dry old fields in the southeastern states, may have invaded the rock areas only since some of the pine trees were cut out.

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